Problem Set 11

Question 1. Starting from 1-methylcyclohexene (A), show how you can synthesize each of the following compounds.
Question 2. In the boxes provided, fill in the missing reagents and structures to complete the synthetic sequence.

[Diagram of synthetic sequence]

Question 3. When alcohol A, below, is treated with mCPBA followed by sodium hydroxide, compound B is produced as the major product. Identify B and provide a mechanism for step 2 of the process.

[Chemical reaction diagram]
Question 4. Compound A, when dissolved in acidic water, produces diol B. Provide a possible structure for A.

\[
\begin{array}{c}
\text{A} \\
C_{10}H_{16}
\end{array} \quad \xrightarrow{\text{H}_2\text{O}, \text{H}^+} \quad \begin{array}{c}
\text{B} \\
\text{Me} \quad \text{OH} \\
\text{OH}
\end{array}
\]

Question 5. Provide the major product of the following reaction.

\[
\begin{array}{c}
\text{Me} \quad \text{O} \quad \text{C} \\
\text{O} \quad \text{N} \quad \text{N}
\end{array} \quad \xrightarrow{\text{hv}} \quad \begin{array}{c}
\text{Me} \quad \text{O} \quad \text{C} \\
\text{O} \quad \text{N} \quad \text{N}
\end{array}
\]
Question 6. Provide reagents that will accomplish the following transformations.

a) \[ \text{H}_3\text{C} \equiv \text{CH} \rightarrow \text{H}_3\text{C} - \text{CH} \]

b) \[ \text{H}_3\text{C} \equiv \text{CH} \rightarrow \text{H}_3\text{C} - \text{CH} \]

c) \[ \text{Br} \quad \rightarrow \quad \text{H}_3\text{C} - \text{CH} \]

d) \[ \text{H}_3\text{C} - \text{CH} \rightarrow \text{H}_3\text{C} - \text{CH} \]
e) $\text{H}_3\text{C} = \text{CH}_3 \rightarrow \begin{array}{c}
\text{H}_3\text{C} \begin{array}{c}
\text{CH}_3
\end{array}
\end{array}$

f) $\text{Me} \equiv \rightarrow \begin{array}{c}
\text{CH}_3
\end{array}$